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ACC NR: AP6012328

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instruction manual summing up the "Measures for preventing accidents and damages". The chapter was compiled on the basis of navigation practice and experience. The crew is well trained for conducting various repairs, preparing spare parts, etc. The organization of special training was briefly described by the author. Submarines are well provided with various spare parts. An example of repairing an electric motor (its insulation damaged by salt water) and other examples were cited. The actions of submarine crews were praised.

SUB CODE: 13 / SUBM DATE: None

Card 2/2 CC

KUL'NITSKIY, E.L., inzh.-kapitan 2-go ranga

Special training of the personnel of engineering departments of submarines. Mor. sbor. 47 no.6:44-46 Je '64. (MIRA 18:7)

APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927510013-3"

KULOCHKIN, P. (Tambovskaya oblast')

[redacted]

On the rize. Prof.tekh.obr. 13 no.4:18-19 Ap '56. (MLRA 9:8)

1. Direktor remeslennogo uchilishcha No. 1.
(Technical education)

SANDLER, N.I., kand.fiz.-mat.nauk; KULOL', V.V., inzh.

Causes of nonuniform scale removal in the process of pickling hot-rolled strips. Trudy Ukr.nauch.-issl.inst.met. no.5: 302-305 '59. (MIRA 13:1)
(Steel--Corrosion) (Metals--Pickling)

KULOMZIN, V. M.

19882 KULOMZIN, V. M. O padail'nom delitele dlya indikatornykh diagramm. Energet. byulleten, 1949, No. 5, s. 14-16

SO: LETOPIS ZHURNAL STATEY, Vol. 27, MOSKVA, 1949.

KULOMZIN, V.

25682

Vosstanovlenie plotnosti Posadki Proshnevykh Pal'shev V Proushinakh Porshney Energet Byulleteny, 1949, No. 7, s. 11-13.

SO: LETOPIS' No. 34

APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927510013-3"

KULOMZIN, V. M.

PA 164T34

USSR/Engineering - Boilers
Feed Pumps

Jun 50

"Double Piston-Valve Steam Distribution in Single-Cylinder Pumps," V. M. Kulomzin

"Energet Byul" No 6, pp 14-18

Single-cylinder steam pumps with two cylindrical piston valves for steam distribution are sometimes used to feed low-power boilers -- 20-25 tons/hr at pressures of up to 17 at. Describes working system of pumps fitted with this type steam distribution. Includes operational sketches of main and auxiliary piston valves.

[redacted]

164T34

KULOMZIN, V. M.

Pumping Machinery

More information about the pump ND-60, Energ. biul., No. 5, 1952

MONTHLY LIST OF RUSSIAN ACCESSIONS, LIBRARY OF CONGRESS OCTOBER 1952. Unclassified

KULOMZIN, V.

25682 Kulomzin, V. Vosstanovlenie plotnosti posadki porshevykh pal'tsev v proushinakh porshney. Energet. byulleten, 1959, No. 7, s. 11-13

SO: Letopis' Zhurnal'nykh Statey, Vol. 34, Moskva, 1949

KULOMZIN, Yu.M.

Ascending ribbed faces in tree tapping. Gidroliz. i lesokhim. prom. 10 no.3:19-20 '57. (MLRA 10:5)

1. Gor'kkhimles.

(Tree tapping)

KULOMZIN, Yu.M.

Increase the profitableness of turpentining. Gidroliz. i lesokhim. prom. 15 no.2:28-30 '62. (MIRA 18:3)

1. TSentral'nyy nauchno-issledovatel'skiy lesokhimicheskiy institut.

KULOMZIN, Yu.M.

Economic efficiency of larch tapping. Gidroliz. i lesokhim. prom. 16 no.7:26 '63. (MIRA 16:11)

1. TSentral'nyy nauchno-issledovatel'skiy lesokhimicheskiy institut.

KULOMZIN, Yu.M.

Ways to reduce the cost of production in turpentining. Gidroliz. i lesokhim.prom. 18 no.4:26-28 '65. (MIRA 18:6)

1. TSentral'nyy nauchno-issledovatel'skiy i proyektnyy institut lesokhimicheskoy promyshlennosti.

KULON, Gyorgy, dr.

Is it true that during the sun-spot maximum period the chemically unknown so-called "death rays" were detected? Elet tud 15 no.49:1538 4 D '60.

1. Urania Bemutato Csillagvizsgalo igazgatoja, es "Elet es Tudomany" szerkeszto bizottsagi tagja.

KULON, Gyorgy, dr.

Scientific research on the life on Mars. Elet tud 19 no.33: 1547-1550 14 Ag '64.

1. Editorial board member, "Elet es Tudomany", Budap st.

KULONEN, A.F.

Two classes of boundary value problems for the equation $\frac{d^4X}{dx^4} = \lambda X$, which do not change the eigenvalues with varying roles of the matrices of coefficients of boundary value conditions of the Sturm type for the ends of rod when x=0 and x=1. Trudy LKI no.28:203-211 '59. (MIRA 15:5)

1. Kafedra vysshey matematiki Leningradskogo korablestroitel'nogo instituta.
(Differential equations) (Boundary value problems)
(Vibration)

KULONEN, A.F.

Standardization and classificiation of the boundary conditions of the Sturm type of the boundary value problem for the equation $\frac{d^4X}{dx^4} = \lambda X$. Trudy LKI no.31:125-135 '60. (MIRA 15:2)

1. Kafedra vysshey matematiki Leningradskogo korablestroitel'nogo instituta.

(Boundary value problems)

KULONEN, A.F.

Deriving frequency equations in the boundary problem for the $\frac{d^4X}{dx^4} = \lambda X$ equation with arbitrary-type boundary conditions. Trudy LKI no.38:245-252 '62. (MIRA 16:7)

1. Kafedra vysshey matematiki Leningradskogo korablestroitel'nogo instituta.

(Boundary value problems)
(Differential equations)

AUTHOR: KULONEN, G.A.

43-7-17/18

TITLE: Interaction of a Shock Wave and the Boundary Layer in the Neighborhood of the Leading Edge of a Plane Plate for High Supersonic Velocities and With the Consideration of Radiation (Vzaimodeystvie udarnoy volny i pogranichnogo sloya v okrestnosti peredney kromki ploskoy plastinki pri bol'shikh sverkhzvukovykh skorostyakh s uchetom lucheispuskaniya)

PERIODICAL: Vestnik Leningradskogo Universiteta, Seriya Matematiki, Mekhaniki i Astronomii, 1958, Nr 7 (2), pp 172-188 (USSR)

ABSTRACT: The present paper is a short representation of the author's certificate which was written under the leading of Professor I.P.Ginzburg. The given theme is treated under the assumptions that the gas is ideal, that the absorption and the emission of the heat by the plate takes place according to the law $q = \sigma T^4$, that the heat conduction of the plate and the radiation of the gas can be neglected and that the plate is uniformly flown towards under the angle of attack zero. The number P_r is assumed to be arbitrary. The solution of the problem is given with the aid of the integral equations of Li and Nagamatsu [Ref.3] after the distribution of velocity in the boundary layer has been set up as a polynomial of fourth degree and the distribution of temperature as a polynomial of second degree and has been determined from

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Interaction of a Shock Wave and the Boundary Layer in the Neighborhood of the Leading Edge of a Plane Plate for High Supersonic Velocities and With the Consideration of Radiation

43-7-17/18

the boundary conditions. Under corresponding assumptions, many results of the author go over into the results of [Ref.3]. The author's final system of equations is solved graphically in two cases. The results of these solutions are given in figures. Finally there is a short discussion of the results. Partially the author's results seem to be scarcely intelligible; that may be brought back to the short form of the paper. There are 9 figures, 2 Soviet and 4 foreign references.

SUBMITTED: 17 January 1957
AVAILABLE: Library of Congress
Card 2/2 1. Shock waves-Mathematical analysis 2. Boundry layers-Mathematical analysis

89505

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S/043/60/000/001/011/014
C 111/ C 333

AUTHOR: Kulonen, G. A.

TITLE: On the application of the method of successive approximations of M. Ye. Shvets to the calculation of the laminar boundary layer in a compressible gas

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no 1, 1960, 123-131

TEXT: M. Ye. Shvets (Ref. 1: O priblizhennom reshenii nekotorykh zadach gidrodinamiki pogranichnogo sloya [On approximative solutions of some problems of the hydrodynamics of the boundary layer] PMM, XIII, vyp. 3, 1949) developed a successive approximation method for calculating the laminar boundary layer in incompressible fluids; this method was applied to a further analogous problem by L. S. Gandin, R. E. Soloveychik in (Ref. 2: K zadache o laminarnom pogranichnom sloye u poristoy stenki [On the problem of the laminar boundary layer on a porous wall] . PMM, XX, vyp. 5, 1957). The author of the present paper shows that, under a somewhat varied succession of the approximation of the longitudinal component of the velocity and of the brake temperature, the method is also suitable for calculating the laminar boundary layer of a plate which is porous

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On the application of the method . . . C 111/ C 333

and enters trough a compressible gas of the same composition as the main flow.

Especially three particular cases are explicitly considered:

1. $\bar{v}_w = \frac{C}{2\sqrt{x}}$ (v_w -- vertical velocity component on the wall). In this case the boundary layer equations can be transformed into ordinary differential equations with the variable $y/\sqrt{x}$ (see G. G. Chernyy (Ref.3: Laminarnyye dvizheniya gaza i zhidkosti v progranichnom sloye s poverkhnost'yu razryva [Laminar motions of a gas and of a fluid in a boundary layer with surface of discontinuity] . JAN SSSR, otdeleniye tekhnicheskikh nauk, No. 12, 1954)), and there exist rigorous solutions. A comparison of the rigorous solution (Ref. 3) (dotted) with the approximative solution of the author (solid) for the local coefficient of the surface friction $c_f^2 \sqrt{Re_x}$, is shown in figure 1

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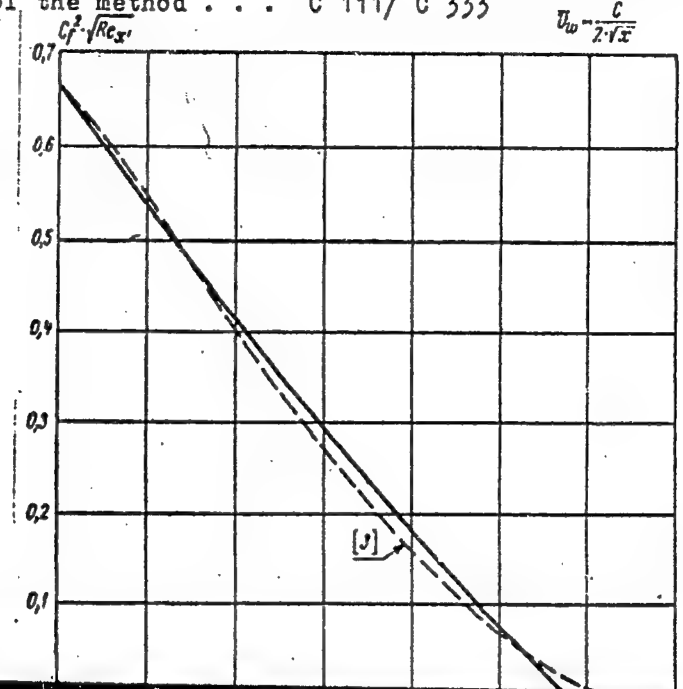
On the application of the method . . . C 111/ C 333



Card 3/4

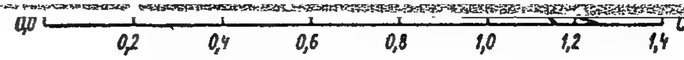


Fig. 1.

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On the application of the method . . . C 111/ C 333

2. $\bar{v}_w$ = const. 3. $\bar{v}_w = \rho_w \cdot C$ and surface temperature is constant.

4. $\bar{v}_w = \rho_w \cdot C$ and surface temperature is variable.

Finally the author states: The penetration of the cold gas through a porous surface depresses the coefficients of surface friction and of heat transfer, the temperature of the plate surface and the quantity of heat which must be extracted from the wall in order that the temperature has its prescribed height. In case 1 the temperature decreases with increasing C and is constant along the surface.

There are 5 figures, and 3 Soviet-bloc references.

SUBMITTED: March 14, 1959

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S/043/60/000/13/12/016
C111/C222

AUTHOR: Kulonen, G.A.

TITLE: Laminar Boundary Layer on the Porous Surface

PERIODICAL: Vestnik Leningradskogo universiteta, Seriya matematiki, mekhaniki i astronomii, 1960, No. 13, pp. 115 - 130

TEXT: The author investigates the diminution of the surface friction and the dropping of the surface temperature by a prescribed injection of a small quantity of gas into the boundary layer. The physical properties of the quantity of gas are only little different from the properties of the gas of the principal flow. It is assumed that the injection has an essential influence only in a thin layer of the wall, while the outer potential flow is not influenced so that the investigation can be carried out with means of the boundary layer theory. In § 1 it is assumed that the pressure gradient in the outer flow equals zero and the laminar boundary layer of a plate (angle of incidence = zero) is investigated under the condition mentioned above. The variables of Crocco are used. The greatest part of the results are already published (Ref. 3). § 2 treats the boundary layer flow of a compressible gas for a variable velocity of the free flow. The problem is
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Laminar Boundary Layer on the Porous Surface S/043/60/000/13/12/016

treated by a generalization of the transformation of Crocco for equations of the laminar boundary layer and by an application of the methods of Kochin - Loytsyanskiy.
There are 6 references : 2 Soviet, 1 Italian and 3 American.

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25498
S/043/61/000/002/008/009
D207/D306

AUTHOR: Kulonen, G.A.

TITLE: On a method of solving a laminar boundary layer problem on the porous surface

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no. 2, 1961, 123 - 135

TEXT: A steady flow is considered of a binary mixture of gases in the laminar boundary layer on a porous surface emitting a low-concentration stream of gas normal to the surface. Physical properties of the component gases are assumed to be significantly different, while stream velocity, temperature of surface and dependence of transport phenomena upon the temperature and concentration are arbitrary. Differential equations of the boundary layer are transformed by change of variables into a set of three non-linear equations of 2nd degree. It is then shown that for ξ = const., expressions of the type

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On a method of solving ...

$$F(\xi_{i+2}, \zeta) = F(\xi_i, \zeta) + 2h \left.\frac{\partial F(\xi, \zeta)}{\partial \xi}\right|_{\xi=\xi_{i+1}} + O(h^3), \tag{2.2}$$

$$\frac{\partial^n F(\xi_{i+2}, \zeta)}{\partial \zeta^n} = \frac{\partial^n F(\xi_i, \zeta)}{\partial \zeta^n} + 2h \left.\frac{\partial^{n+1} F(\xi, \zeta)}{\partial \xi \partial \zeta^n}\right|_{\xi=\xi_{i+1}} + O(h^3), \tag{3.2}$$

$$\left.\frac{\partial F(\xi, \zeta)}{\partial \xi}\right|_{\xi=\xi_{i+2}} = \frac{2}{h} F(\xi_{i+2}, \zeta) - \left[\frac{4}{h} F(\xi_{i+1}, \zeta) - \frac{2}{h} F(\xi_i, \zeta) - \left.\frac{\partial F(\xi, \zeta)}{\partial \xi}\right|_{\xi=\xi_i}\right] + O(h^3). \tag{4.2}$$

can be substituted for the unknown functions. Their solution is then obtained near the leading edge, by expansion into power series of the type

$$\left.\begin{aligned} \tau &= \tau^{(0)}(\zeta) + \tau^{(1)}(\zeta)\xi^{1/2} + \tau^{(2)}(\zeta)\cdot\xi + \dots, \\ \sigma &= \sigma^{(0)}(\zeta) + \sigma^{(1)}(\zeta)\xi^{1/2} + \sigma^{(2)}(\zeta)\cdot\xi + \dots, \\ c &= c^{(0)}(\zeta) + c^{(1)}(\zeta)\xi^{1/2} + c^{(2)}(\zeta)\cdot\xi + \dots \end{aligned}\right\} \tag{7.2}$$

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The case of a flat plate is considered next, and Crocco's variables are used, in which the equations are

$$\frac{\partial^2 \tau}{\partial u^2} = - u \frac{\partial}{\partial x} \left(\frac{\rho\mu}{\tau}\right), \quad \left.\frac{\partial \tau}{\partial u}\right|_{u=0} = \rho_w v_w, \quad \tau(x, 1) = 0, \quad \frac{\partial^2 T}{\partial u^2} + \left[(1 - Pr)\right.$$

$$\left.\frac{\partial \ln \tau}{\partial u} + \frac{\partial}{\partial u}\left(\ln \frac{\lambda}{\mu}\right) + \frac{Pr}{Sc} \cdot \frac{(c_{p2} - 1)}{c_p} \cdot \frac{\partial c}{\partial u}\right] \frac{\partial T}{\partial u} + Pr_1 \frac{\mu}{\lambda} (\gamma_1 - 1) M_0^2 =$$

$$= \frac{\rho\mu}{\tau^2} Pr \cdot u \frac{\partial T}{\partial x}, \quad \left.\frac{\partial T}{\partial u}\right|_{u=0} = \frac{Pr_w}{Pr_1} \cdot \frac{1}{c_{pw}} \cdot \frac{\overset{*}{\tau}_w}{\tau_w} \cdot \left.\frac{\partial \overset{*}{T}}{\partial u}\right|_{u=0} + Pr_w \cdot \frac{c_{p2}}{c_{pw}} \cdot (T_w -$$

$$- T_p + L) \frac{\rho_w v_w}{\tau_w}, \quad T(x, 1) = 1, \quad \frac{\partial^2 c}{\partial u^2} + \left[(1 - Sc) \frac{\partial \ln \tau}{\partial u} - \frac{\partial (\ln Sc)}{\partial u}\right] \frac{\partial c}{\partial u} =$$

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$$= \frac{\varrho\mu}{\tau^2} \mathrm{Sc} \cdot u \frac{\partial c}{\partial x}, \quad \left.\frac{\partial c}{\partial u}\right|_{u=0} = - \mathrm{Sc}_w \cdot (1 - c_w) \frac{\varrho_w v_w}{\tau_w}, \quad c(x, 1) = 0. \tag{1.3}$$

Substituting of

$$\left.\begin{aligned} t = \tau\sqrt{x} &= t^{(0)}(u) + t^{(1)}(u)\sqrt{x} + t^{(2)}(u)\,x + \ldots, \\ T &= T^{(0)}(u) + T^{(1)}(u)\sqrt{x} + T^{(2)}(u)\,x + \ldots, \\ c &= c^{(0)}(u) + c^{(1)}(u)\sqrt{x} + c^{(2)}(u)\,x + \ldots \end{aligned}\right\} \tag{2.3}$$

into Eq. (1.3) and equating to zero coefficients of equal powers of $\sqrt{x}$ gives a set of equations for

$$t^{(i)}, \; T^{(i)}, \; C^{(i)}.$$

On the assumption that the coefficients of viscosity and thermal conductivity of the mixture can be expressed as

$$\begin{aligned} \mu &= p_1(c)\cdot\mu_1 + p_2(c)\cdot\mu_2, \\ \lambda &= q_1(c)\cdot\lambda_1 + q_2(c)\cdot\lambda_2 + q_3(c)\cdot\sqrt{\lambda_1\lambda_2}. \end{aligned} \tag{3.3}$$

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and that $u_1 \sim T$, $\lambda_1 \sim T$ and $D \sim T^2$

$$\left.\begin{aligned}
&\frac{d^2 t^{(1)}}{du^2} - \frac{u}{t^{(0)}} \cdot t^{(1)} + A \cdot \frac{u}{t^{(0)}} \cdot c^{(1)} = 0, \\
&\frac{dt^{(1)}}{du}\Big|_{u=0} = (\rho_w v_w)^{(0)}, \quad t^{(1)}|_{u=1} = 0, \\
&\frac{d^2 T^{(1)}}{du^2} + (1 - \mathrm{Pr}^{(0)}) \frac{d \ln t^{(0)}}{du} \cdot \frac{dT^{(1)}}{du} - 0{,}5\, \mathrm{Pr}^{(0)} \cdot \frac{u}{t^{(0)}} T^{(1)} + \\
&+ \mathrm{Pr}^{(0)} (\gamma_1 - 1) M_0^2 B c^{(1)} + \left\{ - \left[\frac{\mathrm{Pr}^{(0)}}{\mathrm{Sc}^{(0)}} (1 - c_{p2}) + B \right] \frac{dc^{(1)}}{du} + \right. \\
&\left. + (1 - \mathrm{Pr}^{(0)}) \frac{d\,(t^{(1)}/t^{(0)})}{du} - \mathrm{Pr}^{(1)} \frac{d \ln t^{(0)}}{du} \right\} \frac{dT^{(0)}}{du} = 0, \\
&\frac{dT^{(1)}}{du}\Big|_{u=0} = \frac{c_{p2} \mathrm{Pr}^{(0)} (\rho_w v_w)^{(0)} (T_w^{(0)} - T_p + L)}{t_w^{(0)}}, \quad T^{(1)}|_{u=1} = 0, \\
&\frac{d^2 c^{(1)}}{du^2} + (1 - \mathrm{Sc}^{(0)}) \frac{d \ln t^{(0)}}{du} \cdot \frac{dc^{(1)}}{du} - 0{,}5\, \mathrm{Sc}^{(0)} \cdot \frac{u}{t^{(0)}} \cdot c^{(1)} = 0, \\
&\frac{dc^{(1)}}{du}\Big|_{u=0} = - \frac{\mathrm{Sc}^{(0)} (\rho_w v_w)^{(0)}}{t_w^{(0)}}, \quad c^{(1)}|_{u=0} = 0.
\end{aligned}\right| \quad (4.3)$$

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is obtained for the coefficients of $t^{(1)}$, $T^{(1)}$ and $C^{(1)}$, where A and B are constants depending on the gases considered. The example of calculations is given for the case of hydrogen injection into air. There are 3 figures and 6 references: 4 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: J.O. Hirschfelder, C. F. Curtiss, R. Byron, Bird, Molecular theory of gases and liquids, N.Y., 1954; E.R. Eckert, P.J. Schneider, A.A. Hayday, R.M. Larson, Mass-transfer cooling of a laminar boundary layer by injection of a light-weight foreign gas. Jet Propulsion vol. 28, January no. 1, 1958.

Card 6/6

KULONEN, G. A.

Cand Phys-Math Sci, Diss -- "Some methods of calculating the boundary layer on surfaces with heat and mass exchange". Leningrad, 1961. 10 pp, 20 cm (Leningrad Polytec Inst imeni M. I. Kalinin), 180 copies, Not for sale, 15 ref in bibl on pp 9-10 (KL, No 9, 1961, p 175, No 24253). [61-52347]

KULONEN, G.A.

Calculating a laminar boundary layer on a porous system. Vest.LGU 16 no.7:123-135 '61. (MIRA 14:5)
(Boundary layer)

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AUTHOR: Kulonen, G. A.

TITLE: Application of the Kochin-Loytsyanskiy method to the problem of a laminar boundary layer with an interface

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 4, 1962, 480-484

TEXT: Two dimensional boundary layers are investigated near the critical point. It is assumed that a film, forming on the body surface, be in a phase (e.g., liquid) other than that of the adjoining boundary layer (see Fig. 1). Both the density of the liquid and that of the gas are taken as constant, and the physical properties as temperature-independent. The surface tension is neglected. The somewhat specialized system

$$\left.\begin{aligned} &\frac{d^2\tau_1}{d\eta^2}-\beta_*\frac{d}{d\eta}\left(\frac{\eta^2-1}{\tau_{1*}}\right)+\frac{\eta}{\tau_{1*}}=0,\\ &\frac{d^2t_2}{d\eta^2}-\mu_2\beta_*\frac{d}{d\eta}\left(\frac{\rho_2\eta^2-1}{t_{2*}}\right)+\mu_2\rho_2\frac{\eta}{t_{2*}}=0, \end{aligned}\right| \qquad (3)$$

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$$\left.\begin{aligned}
\eta=0:\ \frac{dt_{2s}}{d\eta}\Big|_{\eta=0} &= \rho_2 C_{ws}-\mu_2\beta_s\frac{1}{t_{2sw}},\\
\eta=\mathring{\eta}_s:\ \mathring{\tau}_{1s} &= \mathring{t}_{2s},\\
\mathring{\tau}_{1s}\frac{d\tau_{1s}}{d\eta}\Big|_{\eta=\mathring{\eta}_s} &= \beta_s(\mathring{\eta}_s^2-1),\\
\mathring{t}_{2s}\frac{dt_{2s}}{d\eta}\Big|_{\eta=\mathring{\eta}_s} &= \mu_2\beta_s(\rho_2\mathring{\eta}_s^2-1),\\
\eta=1:\ \tau_{1s}|_{\eta=1} &= 0.
\end{aligned}\right\}$$

provides the initial equations.

$$\xi=\int_0^x u_0dx,\quad \eta=\frac{u}{u_0},\quad \zeta=\frac{u_0}{\sqrt{2\xi}}y;\quad \tau_1=\frac{\partial\eta}{\partial\zeta}\Big|_\xi,\quad t_2=\mu_2\frac{\partial\eta}{\partial\zeta}\Big|_\xi;$$

$$\beta(\xi)=\frac{2\xi}{u_0}\frac{du_0}{d\xi},\quad C_w(\xi)=\frac{v_w\sqrt{2\xi}}{u_0}.$$

$$\beta(\xi)=\beta_s=\text{const},\quad C_w(\xi)=C_{ws}=\text{const} \qquad (2).$$

Application of the Kochin- ...

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The indices "O", "*", and "w" refer to the external boundary of the layer, to its interface, and to the body surface. System (3) is linearized with $g = g_s + \Delta g$; $(\Delta g/g_s \ll 1)$ $(g = \tau_1, t_2, \overset{*}{\eta})$. The solutions for g are given as power series of ξ. The coefficients of the polynomials in η appearing therein are determined from recurrence formulas and from the boundary conditions. From these formulas and conditions, a system of equations of η alone is obtained by transformation. The relevant solution has earlier been discussed by the author (Vestn. LGU, no. 13, 1960). In general, $\eta = \varphi(\frac{y}{\delta_{20}}, f_o, \dots f_m \dots; \xi)$, where $\delta_{20} = \left[\int_0^\infty \eta(1 - \eta)dy\right]_{c_\omega = c_{\omega s}}$; f_o and f_n are undetermined functions of ξ, and $n = 1,2 \dots m$. Finally, the special function $\frac{y}{\delta_{20}} = A_o(\eta, f_o, c_{\omega s}) + \sum P_{\alpha_n} A_n(\eta, f_n)(2\xi)^{\alpha_n}$ is considered. Using this function, a complex expression for $\overset{*}{\eta}$ is obtained after a great number of transformations. The present considerations can easily be extended, to axial symmetry. There is 1 figure.

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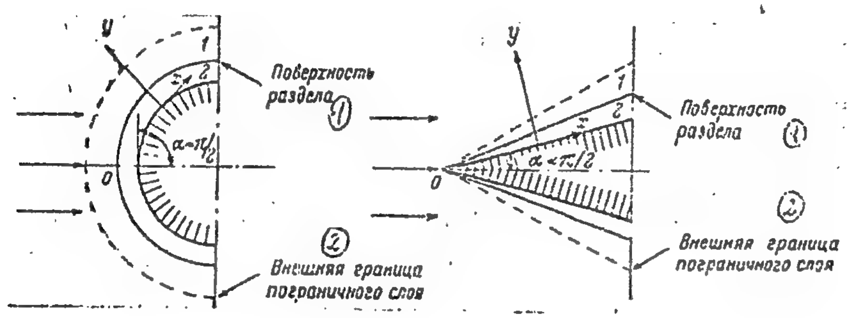
Application of the Kochin- ... S/057/62/032/004/014/017
B111/B102

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: April 24, 1961

Legend to Fig. 1: (1) interface, (2) external boundary of the layer.



Card 4/4

KULONEN, G.A.; KULONEN, L.A.

Investigating the laminar boundary layer in noncompressible and compressible fluids. Izv. vys. ucheb. zav.; av tekh. 8 no. 4: 29-37 '65 (MIRA 19:1)

L 21310-66 EWT(1)/EWP(m)/EWA(d)/ETC(m)-6/EWA(1) WW

ACC NR: AP6006897 SOURCE CODE: UR/0043/66/000/001/0145/0153

AUTHORS: Kulonen, G. A.; Kulonen, L. A. 47

ORG: none B

TITLE: On the calculation of axisymmetric vortex flow of an ideal incompressible fluid in curvilinear channels 1,55

SOURCE: Leningrad. Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no. 1, 1966, 145-153

TOPIC TAGS: incompressible flow, vortex, approximation method, nonlinear differential equation

ABSTRACT: The flow of an ideal incompressible fluid in axisymmetric curvilinear channels is investigated. The governing continuity and momentum equations are reduced to a single nonlinear partial differential equation given by

$$\frac{\partial^2 Q}{\partial y^2}+A(x, y)\frac{\partial Q}{\partial y}+B(Q)+C(x, y)\frac{\partial Q}{\partial x}+D(x, y)\frac{\partial^2 Q}{\partial x^2}=0,$$

$$Q(x, 0)=0,\ Q(x, \overset{*}{y})=1,$$

$$\lim_{x\to\pm\infty}\frac{\partial Q}{\partial x}=0.$$

Card 1/2 UDC: 532.503.1.

L 21310-66

ACC NR: AP6006897

where $Q = 2\pi\psi$ and represents the flow rate between two streamlines. The solution to this equation is obtained by means of successive approximations. The zeroth and first approximations are obtained by assuming quadratic functions for $Q^{(0)} = (x,y)$ and $Q^{(1)} = (x,y)$ and integrating the resultant ordinary differential equations by a finite difference scheme. A special example representing a 90°-elbow is selected to illustrate the method. Numerical results are obtained up to a first approximation in Q. Orig. art. has: 29 equations and 6 formulas.

SUB CODE: 20/ SUBM DATE: 24Jun64

Card 2/2

L [illegible] EWP(m)/EWT(1)/EWT(m) IJP(c) WW

ACC NR: AP6003180 SOURCE CODE: UR/0147/65/000/004/0029/0037

AUTHOR: Kulonen, G. A.; Kulonen, L. A.

ORG: none

54
B

TITLE: Study of the laminar boundary layer in incompressible and compressible liquids

SOURCE: IVUZ. Aviatsionnaya tekhnika, no. 4, 1965, 29-37

TOPIC TAGS: boundary layer theory, hydrodynamic theory, fluid dynamics

ABSTRACT: The article first considers the boundary layer in flow of a compressible liquid around a plate. The boundary layer equations for flow around a plate at a null angle of attack, and the corresponding boundary conditions in dimensionless Crocco variables are of the form:

$$\tau''_{uu} + u\,(\rho\mu/\tau)'_x = 0,\ \tau'_u(x, 0) = 0,\ \tau(x, 1) = 0,$$
$$T''_{uu} + [(1 - \mathrm{Pr})(\ln\tau)'_u - (\ln(\mathrm{Pr}/C_p))'_u]\,T'_u + a\mathrm{Pr}/C_p - \mathrm{Pr}\rho\mu u\ (1/\tau^2)\,T'_x = 0,$$
$$T(x, 0) = T_w,\ T(x, 1) = 1, \tag{1}$$

where τ and T are the sought for functions of the independent variables x and u; $\rho T = 1$; μ, λ, C_p, Pr are known functions of T;

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ACC NR: AP6003180

$$\tau=\overset{*}{\tau}\sqrt{\overline{\mathrm{Re}}}/\bar{\rho}\bar{u}^2,\ \overset{*}{\tau}=\overset{*}{\mu}(\overset{*}{u})_y,\ \overline{\mathrm{Re}}=\bar{\rho}\bar{u}l/\bar{\mu},$$

$$T=\overset{*}{T}/\bar{T},\ \rho=\overset{*}{\rho}/\bar{\rho},\ \mu=\overset{*}{\mu}/\bar{\mu},\ \lambda=\overset{*}{\lambda}/\bar{\lambda},\ C_p=\overset{*}{C}_p/\bar{C}_p,\ \mathrm{Pr}=\overset{*}{C}_p\overset{*}{\mu}/\overset{*}{\lambda},\ R=\overset{*}{R}/C_p,$$

$$x=\overset{*}{x}/l,\ y=\overset{*}{y}\sqrt{\overline{\mathrm{Re}}}/l,\ u=\overset{*}{u}/\bar{u},$$

$\alpha = u^2/C_pT$, T_w is the dimensionless temperature of the surface of the plate; the sign * denotes dimensional quantities; the sign ---- denotes dimensional quantities in the outer boundary layer; the symbols $(\ )'_x$, $(\ )'_y$, $(\ )'_u$, $(\ )''_{uu}$ signify differentiation with respect to x, y, and u. The second part of the article treats the problem of the boundary layer around a hydrofoil in an incompressible liquid. The motion of an incompressible liquid around a hydrofoil of infinite length in the laminar sublayer is described as follows:

$$f'''_{\eta\eta\eta}+ff''_{\eta\eta}+2\beta(1-f'^2_\eta)=2\xi(f''_\eta f''_{\xi\eta}-f'_\xi f''_{\eta\eta}),$$

$$f(\xi,0)=0,\ f'_\eta(\xi,0)=0,\ f'_\eta(\xi,\infty)=1. \quad (14)$$

Here ξ, η are independent variables; $f(\xi, \eta)$ is connected in a known manner with the function of the flow; $\beta=\frac{\xi\tilde{u}'_\xi}{\tilde{u}}$ ($\tilde{u}$ is the longitudinal

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L 04811-67

ACC NR: AP6003180

component of the velocity in the external flow. By transformation to new variables, the article proceeds to a mathematical solution of the two cases. Orig. art. has: 24 formulas, 2 figures and 1 table.

SUB CODE: 20/ SUBM DATE: 21Jan65/ ORIG REF: 002/ OTH REF: 002

Card 3/3 gl

10.6200

20767
S/043/61/000/001/009/010
C111/C222

AUTHOR: Kulonen, L.A.

TITLE: Solution of the laminar boundary layer problem on the flat plate in dissociating gas

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no.1, 1961, 128-132

TEXT: The laminar boundary layer problem on the flat plate with an account of the non-equilibrium dissociation of diatomic gas is considered. A method of numerical solution of boundary layer equations is proposed. The method can be applied for solving boundary problems on the bodies with longitudinal pressure gradients.
After the introduction of the Crocco-variables x and y, the boundary layer equations are taken in the dimensionless form

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$$
\left.
\begin{aligned}
&\frac{\partial^2\tau'}{\partial u'^2}+u'\frac{\partial}{\partial x'}\left(\frac{\rho'\mu'}{\tau'}\right)=0,\\
&\frac{\partial^2 T'}{\partial u'^2}\left(\frac{\lambda'}{\mu'}\right)+\frac{\partial T'}{\partial u'}\left\{\frac{\partial(\lambda'/\mu')}{\partial u'}+\frac{\mathrm{Pr}_0}{\mathrm{Sc}}\frac{\partial\varepsilon}{\partial u'}(c'_{pa}-c'_{pM})+\right.\\
&\left.\quad+\frac{\partial\ln\tau'}{\partial u'}\left[\frac{\lambda'}{\mu'}-\mathrm{Pr}_0\cdot\varepsilon\,(c'_{pa}-c'_{pM})-\mathrm{Pr}_0 c'_{pM}\right]\right\},\\
&-\frac{\partial T'}{\partial x'}\frac{\rho'\mu'}{\tau'^2}u'\,\mathrm{Pr}_0\left[\varepsilon\,(c'_{pa}-c'_{pM})+c'_{pM}\right)+\alpha-\mathrm{Pr}_0\frac{\mu'}{\tau'^3}(H'_a-H'_M)\Phi=0,\\
&\frac{\partial^2\varepsilon}{\partial u'^2}\left(\frac{1}{\mathrm{Sc}}\right)+\frac{\partial\varepsilon}{\partial u'}\left[\frac{\partial\ln\mathrm{Sc}}{\partial u'}-\frac{\partial\ln\tau'}{\partial u'}\left(\frac{1}{\mathrm{Sc}}-1\right)\right]-\frac{\partial\varepsilon}{\partial x'}\frac{\rho'\mu'}{\tau'^2}+\frac{\mu'}{\tau'^3}\Phi=0.
\end{aligned}
\right\}\quad(2)
$$

Here $x' = \frac{x}{l}$, l -- length of the plate, $u' = \frac{u}{u_o}$, u_o -- velocity of the outer flow, $\tau' = \frac{\tau}{\sqrt{Re_o}\,\rho_o u_o^2}$, $\rho' = \frac{\rho}{\rho_o}$, ρ -- density of the mixture of atoms and molecules, $\mu' = \frac{\mu}{\mu_o}$, μ -- tenacity coefficient of the mixture, $T' = \frac{T}{T_o}$, $c'_{pM} = \frac{c_{pM}}{c_{po}}$, $c'_{pa} = \frac{c_{pa}}{c_{po}}$, where c_{pM} and c_{pa} are the

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specific amounts of heat of the molecular and the atomic component, $H' = \frac{H}{c_{po}T_o}$, $H'_M = \frac{H_M}{c_{po}T_o}$, where H and H_M are the specific heat contents of the mixture and the molecular component ($H_M = \int_0^T c_{pM} dt$), $\phi = \frac{m_a K_a}{\varrho_o} \frac{1}{u_o}$, where m_a -- molecular weight of the atomic component, K_a -- absolute molar velocity of the atomization by dissociation of the molecules and recombination, $Sc = \frac{\mu}{\varrho D_{12}}$, where D_{12} -- coefficient of the concentration diffusion, Re_o -- Reynolds number, Pr_o -- Prandtl group, $\alpha = (\gamma - 1) M_o^2$, $\gamma = \frac{c_{po}}{c_{vo}}$, M_o -- Mach number. The friction stress τ (τ' resp.), the temperature T (T' resp.) and the degree of dissociation ξ are sought functions. In the following the primes are omitted. The author solves the system (2) for the boundary conditions

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$$\left.\begin{array}{l}\left.\frac{\partial \tau}{\partial u}\right|_{u=o} = 0, \quad \left. f(T, \frac{\partial T}{\partial u})\right|_{u=o} = 0, \quad \left.\frac{\partial \varepsilon}{\partial u}\right|_{u=o} = 0, \\ \tau|_{u=1} = 0, \quad T|_{u=1} = 1, \quad \varepsilon|_{u=1} = 0\end{array}\right\} \qquad (3)$$

with the arrangement

$$\left.\begin{array}{l}\tau = \frac{\tau_{(o)}}{\xi} + \tau_{(1)} + \tau_{(2)}\xi + \tau_{(3)}\xi^2 + \dots, \\ T = T_{(o)} + T_{(1)}\xi + T_{(2)}\xi^2 + \dots, \\ \varepsilon = \varepsilon_{(o)} + \varepsilon_{(1)}\xi + \varepsilon_{(2)}\xi^2 + \dots,\end{array}\right\} \qquad (4)$$

where $\xi = \sqrt{x}$, and the coefficients $\tau_{(i)}$, $T_{(i)}$, $\varepsilon_{(i)}$ depend only on the velocity. For the coefficients the author obtains the systems

$$\left.\begin{array}{l}\dot{\tau}_{(o)} + \tau_{(o)}^{-1} \cdot a_{o1}(u, T_{(o)}) = 0 \\ \ddot{T}_{(o)} b_{o1}(T_{(o)}) + [\dot{T}_{(o)}]^2 b_{o2}(T_{(o)}) + \dot{T}_{(o)} \cdot b_{o3}(T_{(o)}, \tau_{(o)}, \dot{\tau}_{(o)}, Pr_o) + \varkappa = 0\end{array}\right\} (5)$$

and

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$$\left.\begin{aligned}
&\ddot{\tau}_{(1)}+\dot{\tau}_{(1)}a_{11}(u)+T_{(1)}a_{12}(u)+\varepsilon_{(1)}a_{13}(u)=0,\\
&\ddot{T}_{(1)}b_{11}(u)+\dot{T}_{(1)}b_{12}(u)+T_{(1)}b_{13}(u)+\dot{\varepsilon}_{(1)}b_{14}(u)+\varepsilon_{(1)}b_{15}(u)+\\
&\quad+\dot{\tau}_{(1)}b_{16}(u)+\tau_{(1)}b_{17}(u)=0,\\
&\ddot{\varepsilon}_{(1)}+\dot{\varepsilon}_{(1)}c_{11}(u)+\varepsilon_{(1)}c_{12}(u)=0.
\end{aligned}\right\} \quad (6)$$

Now the general formulas

$$F(x_0+\Delta x,\ u)+F(x_0-\Delta x,\ u)=2F(x_0,\ u)+ \\ +\Delta x^2\frac{\partial^2 F(x,\ u)}{\partial x^2}\bigg|_{x=x_0}+o(\Delta x^4). \quad (9)$$

$$\frac{\partial F(x,\ u)}{\partial x}\bigg|_{x=x_0+\Delta x}=\frac{2}{\Delta x}F(x_0+\Delta x,\ u)+ \\ +\left[\frac{4}{\Delta x}F(x_0,\ u)-\frac{2}{\Delta x}F(x_0-\Delta x,\ u)-\frac{\partial F(x,\ u)}{\partial x}\bigg|_{x=x_0-\Delta x}\right]+o(\Delta x^3). \quad (11)$$

are used. The interval of x is divided into n equal parts $\Delta x = \frac{1}{n}$. If τ, T, ε in the interval $[0, \Delta x]$ are determined with the aid of the series

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Solution of the laminar boundary... S/043/61/000/001/009/010
C111/C222

arrangements (5),(6) and the boundary conditions then τ, T, ϵ and their derivatives for $x = 0$ and $x = \Delta x$ are known, and they can be calculated with the aid of (9),(11) for $x = 2\Delta x$ etc.
There are 2 non-Soviet-bloc references. The reference to the English-language publication reads as follows: S.Glesston, K.Leydler, G.Eyring, Teoriya absolyutnykh skorostey reaktsii, [The theory of absolute reaction velocities], L., IL, 1948.

Card 6/6

KULONEN, L.A.

Solution of equations of a laminar boundary layer on blunt-nosed solids of revolution in a dissociating gas. Vest.LGU 16 no.19: 174-175 '61. (MIRA 14:10)
(Differential equations) (Aerodynamics)

33535
S/043/62/000/001/005/009
D299/D303

11.7430
11.5200

AUTHOR: Kulonen, L. A.

TITLE: Flow of dissociating nitrogen between two parallel plates

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no. 1, 1, 1962, 116 - 123

TEXT: The equations of flow of a binary mixture of gases, between 2 parallel plates, one of which is at rest, and the other moves with constant velocity u_0, are

$$\left.\begin{aligned} &\frac{d}{dy}\left(\mu\frac{du}{dy}\right)=0,\\ &\frac{d}{dy}\left[\lambda\frac{dT}{dy}+\rho D_{12}(h_A-h_M)\frac{d\varepsilon}{dy}\right]+\mu\left(\frac{du}{dy}\right)^2=0,\\ &\frac{d}{dy}\left(\rho D_{12}\frac{d\varepsilon}{dy}\right)+m_A K_A=0,\\ &p=(1+\varepsilon)\rho RT, \end{aligned}\right| \qquad (1)$$

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where μ and λ are the coefficients of viscosity and heat-conductivity; D - the diffusion coefficient; h_A, H_M, h - the specific enthalpies of the atoms, molecules and their mixture; m_A - the atomic weight of the gas; K_A - the absolute molar speed of the reaction; R - the gas constant; T - the gas temperature; ε - the degree of dissociation. Let y_0 denote the distance between the plates. The solution to system (1) should satisfy the following boundary conditions

$$\left.\begin{aligned} y = 0:\ u = 0,\ T = T_1, \\ y = y_0:\ u = u_0,\ T = T_2. \end{aligned}\right\} \qquad (2)$$

After one integration and a change of variables $\tau = \mu(du/dy)$ one obtains

$$\left.\begin{aligned} &\tau = \text{const}, \\ &\frac{\lambda}{\mu}\frac{dT}{du} + \frac{(h_A - h_M)}{S_c}\frac{d\varepsilon}{du} = -u + \text{const}, \\ &\frac{d}{du}\left[\frac{1}{S_c}\frac{d\varepsilon}{du}\right] + \frac{\mu}{\tau^2} m_A K_A = 0, \end{aligned}\right| \qquad (4)$$

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where $S_c = \dfrac{\mu}{\rho D_{12}}$. The boundary conditions are

$$\left.\begin{aligned} u = 0:\ & T = T_1;\ \varepsilon = \varepsilon_1 \text{ or } d\varepsilon/du = 0, \\ u = u_0:\ & T = T_2;\ \varepsilon = \varepsilon_2, \end{aligned}\right\} \qquad (6)$$

where ε_1 and ε_2 are the equilibrium values of the degree of dissociation, corresponding to T_1 and T_2. System (4) with conditions (6) was solved for the following values: $p = 0.05$ atm., $u_0 = 1000$ m/sec $T_1 = 2000^\circ$K, $T_2 = 8000^\circ$K. The thermodynamic functions of the dissociated nitrogen are determined by the thermodynamic parameters of its components and the degree of dissociation. The viscosity and the coefficients of heat conductivity and of diffusion are determined by formulas adopted from the references; the degree of dissociation is a function of temperature and of pressure. The solution is then given of system (4) for various chemical stages of the flow: 1) Dissociation is neglected ($\varepsilon = 0$). 2) Chemical equilibrium in the entire flow, neglect of diffusion heat-conductivity, i.e.

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$D_{12} = 0$. 3) Chemical equilibrium with allowance for diffusion heat-conductivity. 4) Chemically constant case ($K_A = 0$),

$$\left.\frac{d\varepsilon}{du}\right|_{u=0} = 0, \quad \varepsilon\Big|_{u=u_0} = \varepsilon_2.$$

5) Chemically constant case ($K_A = 0$),

$$\varepsilon\Big|_{u=0} = \varepsilon_1, \quad \varepsilon\Big|_{u=u_0} = \varepsilon_2;$$

this case involves the solution of a system of 2 non-linear second-order equations

$$\frac{d}{du}\left[\frac{1}{S_c}\frac{d\varepsilon}{du}\right]=0,$$

$$\frac{\lambda}{\mu}\frac{dT}{du}+\frac{(h_A-h_M)}{S_c}\frac{d\varepsilon}{du}=-\iota^* u+\text{const.}$$

This system was solved as follows: Taking as the zeroth approximation, the solution to system (4) in the 3-rd case, one obtains from the diffusion equation the first approximation to the degree of

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dissociation ε. Substituting the zeroth temperature-approximation and the first ε-approximation in all the terms of the energy equation (except dT/du), one obtains the first temperature-approximation. Analogously, the other approximations can be obtained. The third approximation is shown in the figures. The main effect of dissociation on the flow characteristics, takes place through diffusion heat-conductivity. Thus, even in case of chemical equilibrium in the entire flow, it is necessary to take into consideration diffusion heat-conductivity. It is concluded that: 1) In all the chemical states of the flow where dissociation was taken into account, the friction was found to be stronger than without dissociation. 2) The catalytic action of the walls has greater influence on the friction, temperature distribution and degree of dissociation, than the chemical state. 3) In case of catalytic walls, the chemical state of the flow does not practically affect friction; however, the heat flow to the "cold" wall and the degree-of-dissociation distribution are dependent on the chemical state. 4) Dissociation has an insignificant effect on friction and heat flow to the "cold" wall, if diffusion heat-conductivity is neglected. There are 5 figures

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Flow of dissociating nitrogen between... D299/D303

and 10 references: 4 Soviet-bloc and 6 non-Soviet-bloc, (including 1 translation). The references to the English-language publications read as follows: I.O. Hirschfelder, Ch.F. Curtiss and R.B. Bird, Molecular theory of gases and liquids, N.Y., 1954; Proc. joint conf. thermodyn. and transport properties of fluids (1957, London), London 1958; C.W. Baulknight, Transport properties in gases. Proc. 2nd 1957 gas dynamics symposium, Northwestern University Press, 1958; E.H. Kennard. Kinetic theory of gases, N.Y., 1938.

Card 6/6

24.4300

S/043/62/019/004/003/004
D237/D308

AUTHOR: Kulonen, L.A.

TITLE: Calculation of the laminar boundary layer on the bodies of revolution by the method of successive approximations

PERIODICAL: Universitet. Leningrad. Vestnik. Seriya matematiki, mekhaniki i astronomii, v. 19, no. 4, 1962, 86-95

TEXT: The initial equations describe a high-temperature laminar boundary layer on a body of revolution, in a stream of a binary gas mixture in which a reaction $X_2 \rightleftharpoons 2X$ is possible, and diffusion takes place. Also, the relation is assumed between the temperature and concentration on the surface, and the magnitude of thermal and diffusion streams. Dimensionless and Crocco's variable are used and the equations of the boundary layer are obtained in asymptotic form. A version of the method of successive approximations is used in which the number of unknown parameters and unknown functions is the same. The method is illustrated by an example of

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Calculation of the laminar ... S/043/62/019/004/003/004
D237/D308

calculation of laminar boundary layer on a flat plate without pressure gradient. Gratitude is expressed to Prof. I.P. Ginzburg for attention and help given. There is 1 figure.

SUBMITTED: February 22, 1962

APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927510013-3"

KULONEN, L. A.

Feasibility of numerical solution of the problem involving a laminar boundary layer on a semi-infinite body with suction in a dissociating gas. Vest. LGU 18 no.1:148-150 '63.
(MIRA 16:1)

(Boundary layer) (Boundary value problems)

APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927510013-3"

ACCESSION NR: AP4040724 S/0043/64/000/002/0091/0106

AUTHOR: Kulonen, L. A.

TITLE: Computation of laminar boundary layers on solids of revolution

SOURCE: Leningrad. Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no. 2, 1964, 91-106

TOPIC TAGS: revolution solid, boundary layer, laminar boundary layer, integration, line method, successive approximation, compressible fluid, incompressible fluid, diatomic gas, supersonic gas flow

ABSTRACT: The paper presents a new method for the numerical integration of the equations of laminar boundary layers, based on a combination of the method of lines and the method of successive approximations. The method can be applied to the study of laminar boundary layers in either incompressible or compressible fluids. In the latter case, the flow conditions may be complicated by exchanges of heat and mass, chemical reactions and the heterogeneity of the medium. The treatment is carried out for solids of revolution in an environment of dissociated diatomic gases. Separate sections are devoted to solids of revolution in the presence of a longitudinal pressure gradient, and a cone in a supersonic gas flow. Several

ACCESSION NR: AP4040724

examples are given. "In conclusion, the author thanks Prof. I. P. Ginzburg for his help." Orig. art. has: 3 figures and 14 numbered formulas.

ASSOCIATION: none

SUBMITTED: 12Apr63

ENCL: 00

SUB CODE: MA, ME

NO REF SOV: 003

OTHER: 009

KULOYEN, G.A.; KULOYEN, L.A.

Investigating the laminar boundary layer in noncompressible and compressible fluids. Izv. vys. ucheb. zav.; av tekh. 8 no. 4: 29-37 '65 (MIRA 19:1)

L 21310-66 EWT(1)/EWP(m)/EWA(d)/ETC(m)-6/EWA(1) WW

ACC NR: AP6006897 SOURCE CODE: UR/0043/66/000/001/0145/0153

AUTHORS: Kulonen, G. A.; Kulonen, L. A. 47

ORG: none B

TITLE: On the calculation of axisymmetric vortex flow of an ideal incompressible fluid in curvilinear channels 1,55

SOURCE: Leningrad. Universitet. Vestnik. Seriya matematiki, mekhaniki i astronomii, no. 1, 1966, 145-153

TOPIC TAGS: incompressible flow, vortex, approximation method, nonlinear differential equation

ABSTRACT: The flow of an ideal incompressible fluid in axisymmetric curvilinear channels is investigated. The governing continuity and momentum equations are reduced to a single nonlinear partial differential equation given by

$$\frac{\partial^2 Q}{\partial y^2}+A(x, y)\frac{\partial Q}{\partial y}+B(Q)+C(x, y)\frac{\partial Q}{\partial x}+D(x, y)\frac{\partial^2 Q}{\partial x^2}=0,$$

$$Q(x, 0)=0, \; Q(x, \overset{*}{y})=1,$$

$$\lim_{x\to\pm\infty}\frac{\partial Q}{\partial x}=0.$$

Card 1/2 UDC: 532.503.1.

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ACC NR: AP6006897

where $Q = 2\pi\psi$ and represents the flow rate between two streamlines. The solution to this equation is obtained by means of successive approximations. The zeroth and first approximations are obtained by assuming quadratic functions for $Q^{(0)} = (x,y)$ and $Q^{(1)} = (x,y)$ and integrating the resultant ordinary differential equations by a finite difference scheme. A special example representing a 90°-elbow is selected to illustrate the method. Numerical results are obtained up to a first approximation in Q. Orig. art. has: 29 equations and 6 formulas.

SUB CODE: 20/ SUBM DATE: 24Jun64

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L 08611-67 EWT(m)/EWT(1)/EWT(m) IJP(c) WW

ACC NR: AP6003180 SOURCE CODE: UR/0147/65/000/004/0029/0037

AUTHOR: Kulonen, G. A.; Kulonen, L. A.

54
B

ORG: none

TITLE: Study of the laminar boundary layer in incompressible and compressible liquids

SOURCE: IVUZ. Aviatsionnaya tekhnika, no. 4, 1965, 29-37

TOPIC TAGS: boundary layer theory, hydrodynamic theory, fluid dynamics

ABSTRACT: The article first considers the boundary layer in flow of a compressible liquid around a plate. The boundary layer equations for flow around a plate at a null angle of attack, and the corresponding boundary conditions in dimensionless Crocco variables are of the form:

$$\tau''_{uu} + u(\rho\mu/\tau)'_x = 0,\ \tau'_u(x, 0) = 0,\ \tau(x, 1) = 0,$$
$$T''_{uu} + [(1 - \mathrm{Pr})(\ln\tau)'_u - (\ln(\mathrm{Pr}/C_p))'_u]\,T'_u + \alpha\mathrm{Pr}/C_p - \mathrm{Pr}\rho\mu u\ (1/\tau^2)\,T'_x = 0,$$
$$T(x, 0) = T_w,\ T(x, 1) = 1, \tag{1}$$

where τ and T are the sought for functions of the independent variables x and u; $\rho T = 1$; μ, λ, C_p, Pr are known functions of T;

UDC: 532.517.2

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ACC NR: AP6003180

$$\tau = \overset{*}{\tau}\sqrt{\overline{\mathrm{Re}}}/\bar{\rho}\bar{u}^2,\ \overset{*}{\tau} = \overset{*}{\mu}(\overset{*}{u})'_y,\ \overline{\mathrm{Re}} = \bar{\rho}\bar{u}l/\bar{\mu},$$

$$T = \overset{*}{T}/\bar{T},\ \rho = \overset{*}{\rho}/\bar{\rho},\ \mu = \overset{*}{\mu}/\bar{\mu},\ \lambda = \overset{*}{\lambda}/\bar{\lambda},\ C_p = \overset{*}{C}_p/\bar{C}_p,\ \mathrm{Pr} = \overset{*}{C}_p\overset{*}{\mu}/\overset{*}{\lambda},\ R = \overset{*}{R}/C_p,$$

$$x = \overset{*}{x}/l,\ y = \overset{*}{y}\sqrt{\overline{\mathrm{Re}}}/l,\ u = \overset{*}{u}/\bar{u},$$

$\alpha = u^2/C_p T$, T_w is the dimensionless temperature of the surface of the plate; the sign * denotes dimensional quantities; the sign ---- denotes dimensional quantities in the outer boundary layer; the symbols $(\ )'_x$, $(\ )'_y$, $(\ )'_u$, $(\ )''_{uu}$ signify differentiation with respect to x, y, and u. The second part of the article treats the problem of the boundary layer around a hydrofoil in an incompressible liquid. The motion of an incompressible liquid around a hydrofoil of infinite length in the laminar sublayer is described as follows:

$$f'''_{\eta\eta\eta} + ff''_{\eta\eta} + 2\beta(1 - f'^2_\eta) = 2\xi(f''_\eta f''_{\xi\eta} - f'_\xi f''_{\eta\eta}),$$
$$f(\xi, 0) = 0,\ f'_\eta(\xi, 0) = 0,\ f'_\eta(\xi, \infty) = 1. \qquad (14)$$

Here ξ, η are independent variables; $f(\xi, \eta)$ is connected in a known manner with the function of the flow; $\beta = \dfrac{\xi \tilde{u}_\xi}{\tilde{u}}$; ($\tilde{u}$ is the longitudinal

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L 04811-67

ACC NR: AP6003180

component of the velocity in the external flow. By transformation to new variables, the article proceeds to a mathematical solution of the two cases. Orig. art. has: 24 formulas, 2 figures and 1 table.

SUB CODE: 20/ SUBM DATE: 21Jan65/ ORIG REF: 002/ OTH REF: 002

Card 3/3

SULEYMANOV,D.M., otv.red.; KULOSHVILI, I.S., otv.red.; POBEDONOSTSEV,N.M., otv.red.; LANGE,O.K., prof.glav.red.; ABRAMOVICH,M.V.,red.;AZIZBEKOV, Sh.A.,red.; ALIYEV,A.G.,red.; ALIZADE,A.A.,red.; ALIZADE,K.A.,red.; GORIN,V.A.,red.; KASHKAY,M.A.,red.; MEKHTIYEV,Sh.F.,red.; SULTANOV, A.D.,red.; DOLGOV,V., red.izd-va;

[Geology of Azerbaijan; hydrogeology] Geologiia Azerbaidzhana; gidrogeologiia. Glav.red.O.K.Lange.Otv.red.D.M.Suleimanov, I.S.Kuloshvili i N.M.Pobedonostsev. Baku,Izd-vo Akad.nauk Azerb.SSR, 1961. 357 p. (MIRA 14:12)

1. Akademiya nauk Azerbaidzhanskoy SSR, Baku. Institut geologii. (Azerbaijan—Water, Underground)

KULOSHVILI, I.S.; KRASIL'SHCHIKOV, L.A.

Ground waters in the Kirovabad-Kazakh Massif and possibilities of their utilization. Gidr. i mel. 15 no.8:22-25 Ag '63. (MIRA 16:8)

1. Azerbaydzhanskiy gosudarstvennyy institut po proyektirovaniyu vodokhozyaystvennogo stroitel'stva.

LEVI, M.I.; SUCHKOV, Yu.G.; ORLOVA, G.M.; GERASYUK, L.G.; SH[illegible], A.N.; PEYSAKHIS, L.A.; STOGOVA, A.N.; LOPATINA, N.F.; SUKHARNIKOVA, K.A.; PAK, C.Y.; MUMINOV, K.M.; DONSKAYA, T.N.; NASSONOV, L.C.; WEINBLAT, V.I.; MURTAZANOVA, E.S ; STHEIMAN, A.I.; LAVRENTEV, A.F.; BAS[illegible], N.N.; KULOV, G.I.; GOLKOVSKY, G.M.; SALAMANOV, N.I.; ZALYGINA, N.I.

Significance of serological methods in the epizootological study of plague in wild rodents. J. hyg. epidem. (Praha) 8 no.4:422-427 '64.

1. Institute of Scientific Research, Rostov on the Don and Central Asian Institute of Scientific Research, U.S.S.R.

LEVI, M.I.; SUCHKOV, Yu.G.; ORLOVA, G.M.; GERASYUK, I.G.; SHKODA, A.M.; PEYSAKHIS, L.A.; STOGOVA, A.N.; LOPATINA, N.F.; SUKHARNIKOVA, N.A.; PAK, G.Yu.; MUMINOV, K.M.; DONSKAYA, T.N.; NASSONOV, L.S.; VEYNBLAT, V.I.; MURTAZANOVA, E.Sh.; SHTEL'MAN, A.I.; LAVRENT'YEV, A.F.; BASOVA, N.N.; GOLKOVSKIY, G.M.; KULOV, G.I.; SALAMOV, N.I.; ZALYGINA, N.I.

Results of the testing of the reactions of passive hemagglutination and neutralization of antibodies in the epizootologic examination of wild rodents for plague. Zhur. mikrobiol., epid. i immun. 40 no.12: 118-119 D '63. (MIRA 17:12)

1. Iz Rostovskogo i Sredne Aziatskogo protivochumnykh institutov, Chimkentskoy, Taldy-Kurganskoy, Aralomorskoy, Turkmenskoy, Astrakhanskoy i Frunzenskoy protivochumnykh stantsiy.

KULOV, N.N.

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PHASE I BOOK EXPLOITATION SOV/6246

Soveshchaniye po tseolitam. 1st, Leningrad, 1961.

Sinteticheskiye tseolity; polucheniye, issledovaniye i primeneniye (Synthetic Zeolites: Production, Investigation, and Use). Moscow, Izd-vo AN SSSR, 1962. 286 p. (Series: Its: Doklady) Errata slip inserted. 2500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Otdeleniye khimicheskikh nauk. Komisiya po tseolitam.

Resp. Eds.: M. M. Dubinin, Academician and V. V. Serpinskiy, Doctor of Chemical Sciences; Ed.: Ye. G. Zhukovskaya; Tech. Ed.: S. P. Golub'.

PURPOSE: This book is intended for scientists and engineers engaged in the production of synthetic zeolites (molecular sieves), and for chemists in general.

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Synthetic Zeolites: (Cont.) SOV/6246

COVERAGE: The book is a collection of reports presented at the First Conference on Zeolites, held in Leningrad 16 through 19 March 1961 at the Leningrad Technological Institute imeni Lensovet, and is purportedly the first monograph on this subject. The reports are grouped into 3 subject areas: 1) theoretical problems of adsorption on various types of zeolites and methods for their investigation, 2) the production of zeolites, and 3) application of zeolites. No personalities are mentioned. References follow individual articles.

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Synthetic Zeolites: (Cont.)

Pavlova, S. N., Z. V. Driatskaya, and M. A. Mkhchiyan. Application of Synthetic Zeolites in Determining the Content of Normal Alkanes in Gasoline Fractions 253

Galich, P. N., I. T. Golubchenko, A. A. Gutyrya, V. S. Gutyrya, and I. Ye. Neymark. Investigation of the Possible Application of Synthetic Zeolites as Carriers and Catalysts for the Dehydrogenation and Cracking of n-Paraffins 260

Palek, M., P. Iru, O. Grubner, and G. Beyer. Synthetic Zeolites as Molecular Sieves With Color Indication of Water-Vapor Pressure 263

Malyusov, V. A., N. N. Umnik, N. N. Kulov, N. M. Zhavoronkov, G. I. Faydel', and D. O. Zisman. Purifying Formaldehyde From Moisture and Formic Acid With the Aid of Synthetic Zeolites 267

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KULOVA, N.V.

Pathomorphological changes in the afterbirth (placenta, umbilical cord, and membrances) in endometritis in labor; clinico-morphological investigations [with summary in English]. Akush. i gin. 34 no.5;69-73 S-O '58 (MIRA 11:10)

1. Iz kliniki akusherstva i ginekologii (zav. - prof. S.D. Astrinskiy) i kafedry gistologii (zav. - prof. G.G. Nepryakhin) Severo-Osetinskogo meditsinskogo instituta.
(LABOR, compl.
endometritis, histopathol. (Rus))
(ENDOMETRITIS, in pregn.
histopathol. in labor (Rus))

KULOVA, N.V., Cand. Med. Sci., -- (diss) "Data in the pathomorphology of the placenta during certain pyretic conditions in labor (clinico-morphological investigation)," Krasnodar, 1961, 17 pp (Kuban State Medical Institute im. Red Army), 200 copies (KL-Supp 9-61, 191)

KULOYAN, L.T.

Study of the field drying of cut peat in climate conditions of the Armenian S.S.R. Izv.AN Arm.SSR.Ser.FMET nauk 6 no.4:91-99 Jl-Ag '53. (MIRA 9:9)

1.Yerevanskiy politekhnicheskiy institut imeni K.Marksa.
(Armenia--Peat)

KULOYAN, L.T.

Heat conditions for low-temperature combustion of ash-rich fuel. Izv. AN Arm.SSR.Ser.tekh.nauk 11 no.6:53-66 '58. (MIRA 12:3)

1. Yerevanskiy politekhnicheskiy institut imeni Karla Marksa.
(Fuel) (Combustion)

KULOYAN, L.T., dots.

Thermal conditions during the combustion of ash-rich fuel. Izv.vys.ucheb.zav.; energ. 2 no.5:79-88 My '59. (MIRA 12:10)

1. Yerevanskiy politekhnicheskiy institut.
(Combustion)

KULOYAN, L., kand.tekhn.nauk

Secure maximum recovery of condensed water. Prom.Arm. 4 no.5:24-27 My '61. (MIRA 14:8)

(Boilers)

TORGOMYAN, M.S., kand. tekhn. nauk; CHILINGARYAN, L.A., kand. tekhn. nauk; SHAKHBAZYAN, Sh.A., kand. tekhn. nauk; AGAKHANYAN, G.A., kand. sel'khoz. nauk; KULOYAN, L.T., kand. tekhn. nauk; ARSHAKYAN, D.T.; BARKHUDARYAN, I.G.; SARKISYAN, S.G., kand. tekhn. nauk; MKHITARYAN, S.A.; OSEPYAN, A.M., doktor ekon. nauk, prof.; BEK-MAMARCHEV, B.I., kand. geogr. nauk, red.; AYVAZ'YAN, V.G., otv. red.; FEL'DMAN, M.P., otv. red.; AVETISYAN, A.A., tekhn. red.; CHAKHALYAN, TS.P., tekhn. red.

[Results of the combined studies of the Sevan problem]Rezul'taty kompleksnykh issledovanii po Sevanskoi probleme. Erevan, Izd-vo Akad. nauk Armianskoi SSR. Vol.3.[Water resources and power engineering]Vodnoe khoziaistvo i energetika. 1962. 330 p. (MIRA 15:11)

1. Akademiya nauk Armyanskoy SSR, Erivan. Institut vodnykh problem.

(Sevan Lake region--Water resources development)
(Sevan Lake region--Power engineering)

KULOYAN, L., kand.tekhn.nauk

Fuel and power balance in the Armenian industry. Prom.Arm. 5 no.2:11-16 F '62. (MIRA 15:2)
(Armenia--Power resources)

KULOYAN, L.; MIRZOYAN, R.

Efficient combustion of gas fuel in the Armenian industry.
Prom. Arm. 6 no.11:26-29 N '63. (MIRA 17:1)

1. Yerevanskiy politekhnicheskiy institut.

KULCZYCKI, Rafal

Problem of familial eosinophilia in the light of cases handled by the author. Przegl lek 19 no.7:310-313 '63.

1. II Clinic of Internal Diseases, School of Medicine, Krakow. Head: Prof. dr T. Tempka.

KULP, EMOL

CZECHOSLOVAKIA/Chemical Technology - Chemical Products and Application. Fermenting Industry. H-27

Abs Jour : Ref Zhur - Khimiya, No 17, 1958, 58972

Author : Kulp Emol

Inst : -

Title : The Gregor Distillation-Evaporator.

Orig Pub : Kvasny prumysl, 1956, 2, No 5, 113-115

Abstract : The construction of an apparatus is described which consists of 4 evaporating housings in which simultaneous distillation of alcohol from the beer and condensation of the spent wash obtained up to 40° Be. A beer with a content ~ 10% concentration of alcohol enters the first housing and subsequently transfers from one housing to another, in addition being freed of the alcohol. During normal performance of the apparatus, the spent wash must not contain any alcohol upon its outlet from the third housing. Incrustation of evaporator pipes

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Their Application. Fermenting Industry.

Abs Jour : Ref Zhur - Khimiya, No 17, 1958, 58972

is eliminated by a mixture of HCl and H_2SO_4 (1:3). Losses of alcohol comprise 0.3-0.5%, while the outlay of coal is 35 kg (7000 cal/kg) in 100 l of processed anhydrous alcohol.

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MARCZYNSKA, Antonina; ADAMCZYK, Bogumil; KULPA, Jan; LENCZYK, Maria;
OSZACKI, Jan

The composition of the muscle in patients with cancer of the stomach. Nowotwory 15 no.2:145-152 Ap-Je '65.

1. Z Instytutu Onkologii w Krakowie (Dyrektor: prof. dr. med. H. Kolodziejska).

APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927510013-3"

OSZACKI, Jan; URBAN, Anna, MARCZYNSKA, Antonina, KULPA, Jan

Nitrogen balance and stomach ulcer morphology. Nowotwory 13 no.4:289-295 O-D'63.

1. Z Instytutu Onkologii w Krakowie (dyrektor: prof.dr.med. H.Kolodziejska) i z II Kliniki Chirurgicznej AM w Krakowie (kierownik: prof. dr.med. J.Oszacki).

*

MARCZYNSKA, Antonina; OSZACKI, Jan; KULPA, Jan

Body composition in patients with euthyroid goiter. Pol. przegl. chir. 37 no.5:471-477 My '65.

1. Z Instytutu Onkologii w Krakowie (Dyrektor: prof. dr. H. Kolodziejska) i z II Kliniki Chirurgicznej AM w Krakowie (Kierownik: prof. dr. J. Oszacki).

ADAMCZYK, Bogumil; GORNIAK, Antoni; LEWANDOWSKI, Jerzy; KULPA, Jan

Comparative studies on the degree of glomerular filtrat on and phenol red excretion 6 months after cholecystectomy in l:thiasis. Pol. przegl. chir. 37 no.1:37-40 Ja '65

1. Z Instytutu Onkologii, Oddzial w Krakowie (kierownik: prof. dr. H. Kolodziejska) i z II Kliniki Khirurgicznej Akademii Medycznej w Krakowie (kierownik: prof. dr. J. Oszacki).

MARCZYNSKA, Antonina; KULPA, Jan; OSZACKI, Jan

Starch test in the determination of pancreatic function in patients with cancer of the stomach. Nowotwory 15 no.2: 139-144 Ap-Je '65.

1. Z Instytutu Onkologii w Krakowie (Dyrektor: prof. dr. med. H. Kolodziejska).

KULPA, Wladyslaw

Germination biology of spring adonis Adonis vernalis L. Rocz nauk roln rosl 81 no.2:337-382 '60. (EEAI 9:11)

1. Katedra Hodowli Roslin in Nasienictwa Wyzszej Szkoly Rolniczej w Lublinie.
(Poland--Adonis vernalis)

KAZIMIERSKI, Tadeusz; KULPA, Wladyslaw; BLASZCZAK, W.

Book reviews. Postepy nauk roln 11 no.3:153-157 My-Je '64.

IVANOV, P.; KULPE, E.

An international symposium on cattle and swine breeding according to different methods. Selskostop nauka 2 no. 3/4 465-470 '63.

KUL'PIN, B. V., Cand Tech Sci -- (diss) "Influence of Reynolds number on the principal work indices of a jet compressor." Kazan', 1957, 11 pp (Kazan' Aviation Institute) 110 copies (KL, 36-57, 105)

124-58-9-9751

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 9, p 39 (USSR)

AUTHOR: Kul'pin, B. V.

TITLE: Influence of the Reynolds Number on the Fundamental Operational Criteria of a Single-stage Jet Augmenter (Vliyaniye chisla Reynol'dsa na osnovnyye pokazateli raboty odnostupenchatogo struynogo kompressora)

PERIODICAL: Tr. Kazansk. aviats. in-ta, 1957, Vol 37, pp 72-84

ABSTRACT: An experimental investigation was made of the influence of the Reynolds number R of the primary (ejecting) and secondary (ejected) air on the characteristics of a jet augmenter (gas ejector) with sonic nozzles with external and internal feed of high-pressure air. A comparison of ejectors was performed holding the following parameters constant: the ratio of the throat sections of the primary and the secondary air at $\alpha = 0.0814$; the critical value of the ejection coefficient $K_* = 2.5$; the pressure drop at the nozzle of the high-pressure gas was taken to be 3. On the strength of the investigations made, the author concludes as follows: 1) With increasing values of R' (as determined from the flow parameters at the

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124-58-9-9751

Influence of the Reynolds Number (cont.)

exit of the mixing chamber) from 0.3×10^{-6} (sic!) to 0.9×10^{6} the compression ratio of the ejector increased from $\mathcal{E} = 1.055$ to $\mathcal{E} = 1.105$ with external high-pressure-air feed and from $\mathcal{E} = 1.064$ to $\mathcal{E} = 1.084$ with internal primary-air feed. 2) With an increase in R' from 0.37×10^{6} to 1.15×10^{6} the limiting ejection coefficient increases by 20% with either method of high-pressure-air feed. 3) When the primary-air Reynolds number R" changes from 0.2×10^{6} to 1.25×10^{6}, the compression ratio and the efficiency of the ejector varies substantially and a maximum obtains for either method of primary-air feed. 4) The number of high-pressure-gas nozzles may be increased to obtain a decrease in the optimal length of the mixing chamber. Thus, for example, with the external primary-air-feed arrangement and a change from 2 to 12 nozzles, the mixing-chamber length required decreased from 4 diameters to 1 diameter. 5) In the ejector arrangement with internal primary-air feed the highest compression ratio and efficiency were obtained with five high-pressure nozzles and an optimal mixing-chamber length equal to 4.5 diameters 6) All other conditions being equal, an ejector with external primary-air feed exhibits more desirable characteristics than an ejector with internal primary-air feed. The last conclusion by the author is in contradiction with the results of other ejector investigations. Bibliography: 5 references.

1. Gas ejectors--Properties 2. Gas ejectors--Effectiveness 3. Gas ejectors--Mathematical analysis

Card 2/2

Yu. A. Lashkov

KUL'PIN, G. I.

AID P - 2744

Subject : USSR/Engineering

Card 1/1 Pub. 78 - 14/22

Authors : Rakhmilevich, R. Z. and Kul'pin, G. I.

Title : To improve the quality of coke-cleaning hammer heads

Periodical : Neft. khoz., 33, 7, 67-71, Jl 1955

Abstract : These pneumatically-driven centrifugal hammer heads are used to clean the pipes of oil-distilling cracking installations from coke deposits. The author describes the present types of hammer heads produced in Soviet plants and presents a new design of such hammer head and a manufacture procedure to improve its quality. Tables, photos, diagram.

Institution : Some Soviet plants manufacturing hammer heads are mentioned.

Submitted : No date

POPOV, S.S., redaktor vypuska; KUL'PIN, G.I., vedushchiy redaktor; KOROLEVA, L.I., tekhnicheskiy redaktor

[Instructions for installation and use of protective apparatus for shielding underground pipelines from corrosion] Instruktsiia po ustroistvu ekspluatatsii protektornykh ustanovok dlia zashchity podzemnykh truboprovodov ot korrozii. Moskva, TSentral'nyi nauchno-issledovatel'skii institut tekhnicheskoi informatsii i ekon. neftianoi promyshl., 1956. 23 p. (MLRA 9:11)

1. Russia (1923- U.S.S.R.) Ministerstvo stroitel'stva predpriyatiy neftyanoy promyshlennosti.
(Electrolytic corrosion)
(Petroleum--Pipelines)